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# Problems

## Question 1

### (i)

### (ii)

### (iii)

## Question 2

### (i)

The null hypothesis would be . The alternative hypothesis would be

### (ii)

I would expect to have a positive sign, since having a larger population would result in more demand for rental housing.

I would expect to also have a positive sign, since higher income would likely mean that the cost of living is high as well, meaning housing prices and rental rates would be higher.

### (iii)

Because this is a log-log model, the interpretation of this model should be, \*"A 10% increase in population would result an increase of rent of 0.66%.

### (iv)

With a degree of freedom of 60 (64-4), at the 1% level, we

## Question 3

### (i)

### (ii)

### (iii)

### (iv)

## Question 4

### (i)

We can apply the property of variance:

### (ii)

We will need to identify the standard error, or

### (iii)

If then , therefore we can write our population regression model as:

We would estimate y by regressing y on and . This will allow us to calculate the stand error and coefficient of

## Question 5

### (i)

With the negative sign, I would expect that if a profit margins are small, meaning they weren’t that profitable of a company, then that firm would need to pay more in order to attract someone to fill the position.

### (ii)

Yes, the effect is significant. The t value is greater than 2, and this would make sense that companies with larger market values pay more.

### (iii)

The

### (iv)

This could be the result of someone who has stayed with the company for a long time and may not have demands on pay and does the job more out of passion for the company rather than an outsider who may demand large bonus pay to run the company.

# Computer Exercises

## Question 6

### (i)

d1 <- hprice1  
mrm1 <- lm(lprice~sqrft+bdrms, d1)  
stargazer(mrm1, type = 'text', digits = 8)

===============================================  
 Dependent variable:   
 ---------------------------  
 lprice   
-----------------------------------------------  
sqrft 0.00037945\*\*\*   
 (0.00004321)   
   
bdrms 0.02888444   
 (0.02964326)   
   
Constant 4.76602700\*\*\*   
 (0.09704447)   
   
-----------------------------------------------  
Observations 88   
R2 0.58829480   
Adjusted R2 0.57860770   
Residual Std. Error 0.19706340 (df = 85)   
F Statistic 60.72921000\*\*\* (df = 2; 85)  
===============================================  
Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Using the data from HPRICE1, we get the following model:

with an and .

Using our model we get the following estimation:

theta <- 150\*mrm1$coefficients[2]+mrm1$coefficients[3]  
theta

sqrft   
0.08580134

This means that when we add a 150 sqft bedroom, then we can expect the home price to increase by about 8.6%

### (ii)

We can rewrite . In our model, we can substitute to have the following:

### (iii)

d1$bdrms\_150 <- d1$bdrms\*150  
d1$bdrms\_theta <- d1$bdrms\*theta  
se1 <- lm(lprice~(sqrft-bdrms\_150)+(bdrms\_theta), d1)  
stargazer(se1, type = 'text')

===============================================  
 Dependent variable:   
 ---------------------------  
 lprice   
-----------------------------------------------  
sqrft 0.0004\*\*\*   
 (0.00004)   
   
bdrms\_theta 0.337   
 (0.345)   
   
Constant 4.766\*\*\*   
 (0.097)   
   
-----------------------------------------------  
Observations 88   
R2 0.588   
Adjusted R2 0.579   
Residual Std. Error 0.197 (df = 85)   
F Statistic 60.729\*\*\* (df = 2; 85)   
===============================================  
Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## Question 7

### (i)

d2 <- k401ksubs  
d2 %>%   
 filter(fsize==1) %>%   
 count()

## n  
## 1 2017

There are 2017 single person households in the dataset.

### (ii)

d2a <- d2 %>%   
 filter(fsize==1)  
mrm2 <- lm(nettfa~inc+age, d2a)  
stargazer(mrm2, type='text')

##   
## ===============================================  
## Dependent variable:   
## ---------------------------  
## nettfa   
## -----------------------------------------------  
## inc 0.799\*\*\*   
## (0.060)   
##   
## age 0.843\*\*\*   
## (0.092)   
##   
## Constant -43.040\*\*\*   
## (4.080)   
##   
## -----------------------------------------------  
## Observations 2,017   
## R2 0.119   
## Adjusted R2 0.118   
## Residual Std. Error 44.683 (df = 2014)   
## F Statistic 136.465\*\*\* (df = 2; 2014)   
## ===============================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Using only single family households, we get the model:

With an and . This means that for every $1 thousand increase in income means an estimated $799 increase in net wealth. For we interpret that for every year increase, we estimate a $843 net wealth increase. These numbers make sense, and is not too surprising.

### (iii)

The intercept, , means that at age 0 and income = 0, their net wealth is $-43.04. In other words, you are born in debt.

### (iv)

### (v)

## Question 8

### (i)

d3 <- discrim  
mrm3 <- lm(lpsoda~prpblck+lincome+prppov, d3)  
stargazer(mrm3, type='text')

===============================================  
 Dependent variable:   
 ---------------------------  
 lpsoda   
-----------------------------------------------  
prpblck 0.073\*\*   
 (0.031)   
   
lincome 0.137\*\*\*   
 (0.027)   
   
prppov 0.380\*\*\*   
 (0.133)   
   
Constant -1.463\*\*\*   
 (0.294)   
   
-----------------------------------------------  
Observations 401   
R2 0.087   
Adjusted R2 0.080   
Residual Std. Error 0.081 (df = 397)   
F Statistic 12.604\*\*\* (df = 3; 397)   
===============================================  
Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

We get the following model:

With an and . AT the 5% level, is statistically significant, but it is not significant at the 1% level.

### (ii)

pander(cor.test(d3$lincome,d3$prppov))

Pearson’s product-moment correlation: d3$lincome and d3$prppov

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test statistic | df | P value | Alternative hypothesis | cor |
| -31.04 | 407 | 2.349e-109 \* \* \* | two.sided | -0.8385 |

### (iii)